

## Mantis Study Group Newsletter 4

May 1997

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### Editorial

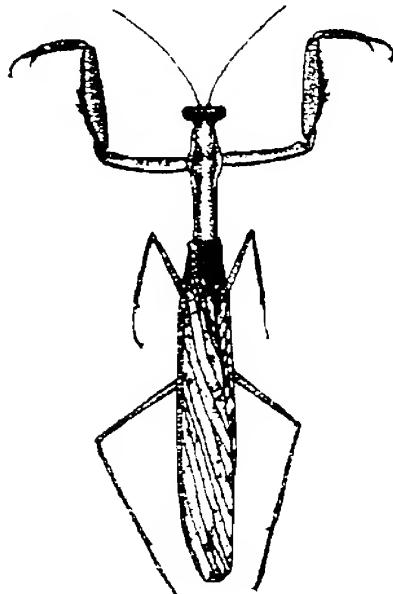
Happy Birthday to us! - Yes, the MSG is one year old on May 18th. It has been a successful start and membership is now in excess of 150. The membership drive has been helped by publicity notices kindly inserted by several entomological publications, particularly *Phasmid Studies*, *Blattodea Culture Group Newsletter*, *Bulletin of the Amateur Entomologists' Society*, and *Antenna*; notices on several homepages on the internet, particularly Gordon Ramel's, have also been responsible for recruiting many members. I'd like to thank Paul Taylor for his efforts as Membership Secretary, Kieren Pitts for arranging the printing and dispatch of the newsletters, and Steve Clark for co-ordinating the livestock. There will be a meeting of the Group from 1100 to 1500 on 17th May at the Birmingham Nature Centre; further details are given below.

More articles are needed for the next *Newsletter*, especially since this issue contains the last part of David Oliveira's key. This issue contains articles from only five members, rather poor considering the size of the Group. Thanks to Daniel Hallett for his illustrations of *Sphodromantis* nymphs (see page 6); Daniel is not an MSG member - but has contributed more to the *Newsletter* than most members!

### MSG Meeting — 17th May

As with the inaugural meeting last year, the meeting will be held in conjunction with the Blattodea Culture Group meeting. This year the meeting is being held on 17th May at Birmingham Nature Centre. The meeting starts at 1100 and ends at 1500. The venue for the meeting is free because we have agreed to put on a display for the public, so bring along your livestock for display; last year saw what was probably the largest ever display of live cockroaches, more than 50 species: we will not be able to beat that but it would be nice to have as many mantids as possible. A map showing the location of the Birmingham Nature Centre is attached to the back of this newsletter, and the following details may help. Birmingham Nature Centre is on the A441 (Pershore Road), in the Edgbaston area, about 3km south of the city centre. It is very close to Pebble Mill (home of the BBC), and at the southern end of Cannon Hill Park. By public transport: catch a bus number 45 or 47 from Birmingham New Street railway station, this will take you along the A441; the bus leaves from outside Rackhams shop on Corporation Street just outside the station.

The following day the British Tarantula Society is holding its annual show at Wood Green High School (Wood Green Road, Wednesbury, N.W. Birmingham - close to junction 9 of the M6) and the MSG will be having a display stand at the show (the show opens at 1030).

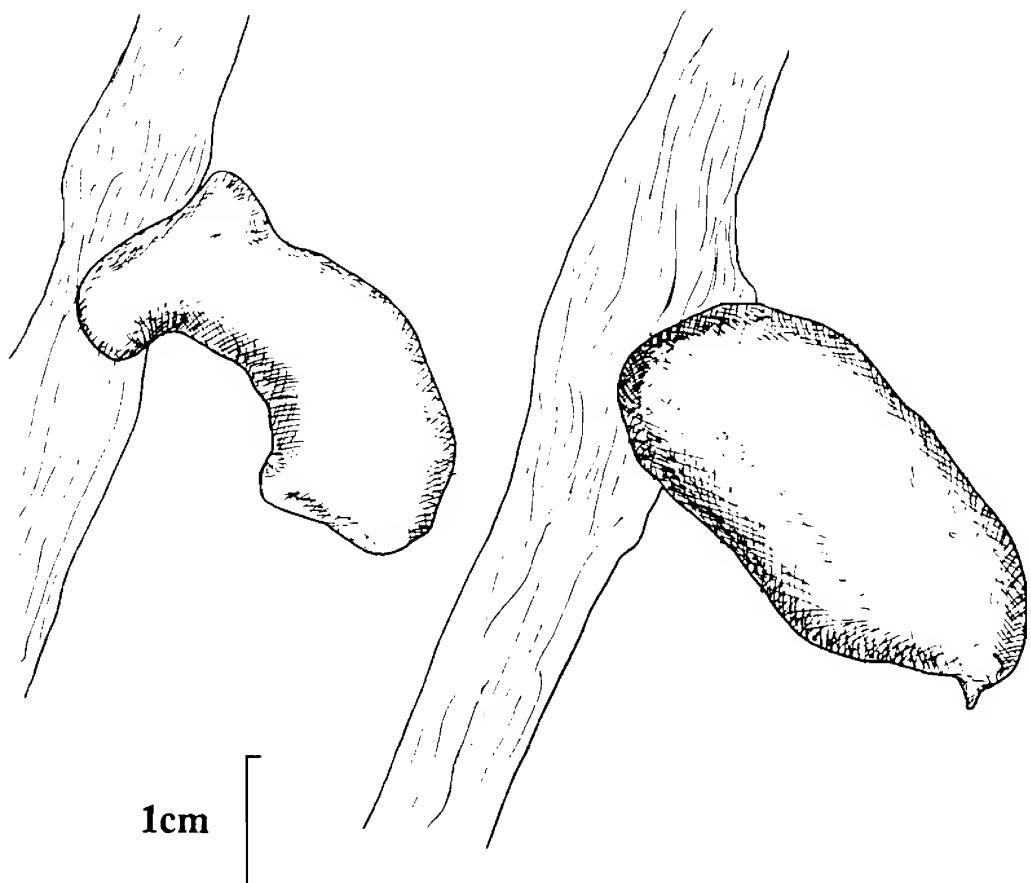


## Livestock request

Steve Clark has asked me to remind members to send any surplus oothecae to him for distribution to other members. We are having some success in spreading the species but there are still many species being kept by only one or two people. Steve is trying to do four things: Firstly, if you send him oothecae of a species he will try to send you a different species. Secondly, if oothecae of the less common species hatch he splits up the nymphs and distributes them to several members. Thirdly, he tries to supply new members with an easy, common species as a way of getting them started. Obviously these three all rely on members sending some of their surplus oothecae to Steve. Lastly he is acting as a dating agency for mantids than need a mate - the success of this depends heavily on people letting him know when they have a spare male (most of his calls are from people with unmated females).

## Oothecae to identify - Phil Bragg.

Illustrated below are two oothecae from common mantids. Can you identify them? Answers are on page 12.



### **Cannibalism in *Tenodera sinensis* - Mike Jope.**

Recently I had an unusual case of cannibalism that I thought might be of interest. I had been trying to pair a female *Tenodera sinensis* for several weeks, every time she laid an ootheca she became "genitally blocked" and I had to help unclog her with tweezers and a soft paintbrush. Rather than subject her to this for a third or fourth time, I decided to leave the male with her in the hope that his attentions might have the same effect. They lived together for about a week with no problems, then I looked in one morning and there was only one mantis present. Not unduly worried (the male in question had had a bad moult and his wings were badly malformed) I checked and, to my horror, the male was sitting there very plump and the remains of the female were lying at the bottom of the cage. I wondered if any other MSG members have had males cannibalise females? Losing males occasionally can be a hazard but this struck me as rather unusual.

### **Unusual Courtship Display in *Tenodera sinensis* - Mike Jope.**

On January 5th 1997 I noticed a small (65mm) male showing an extensive courtship display to a larger (78mm) male in the container next to his own. He was raising his fore and hind wings and pointing and flexing his abdomen vertically upwards whilst swaying alternately from left to right every couple of seconds (This is the only time I have observed this courtship behaviour in *T. sinensis*). When he was placed next to a larger female he stopped for a minute or so and then started displaying to the mated male again. All three were housed in sweet jars with screw lids so he must have selected the other male as a more suitable partner due to his size.

One possibility raised by this is that the tendency of the males to become larger in *T. sinensis* is contributed to by smaller males trying to mate with larger ones and being cannibalised. This may be possible due to the males and females of this species being outwardly very similar, perhaps leading to confusion for the smaller males, larger ones being much less likely to make the same mistake as females tend to be of larger size than their partners.

### **Maggots? - Michael Mann.**

A friend of mine had a large female *Sphodromantis* from Ghana which had been mated with one of my males. The female was kept in a glass tank with a peat substrate, and twigs for her to climb on. As the weeks went by she became very plump and, we thought, full of eggs. However, my friend rang to say she was dead, not having produced an ootheca; on examination her body cavity was full of small white maggots.

Has anyone else experienced this? Did they come out of the peat? Or were they living as parasites inside the black crickets on which the mantis was fed? I have read a number of stories of people losing expensive tarantulas after feeding them locusts which contained nematode worms. Can anyone shed any light on this?

## Or Eggs? - Phil Bragg.

I strongly suspect that what Michael Mann's friend saw inside his dead female *Sphodromantis* were the eggs which she had been unable to lay (see article above). The eggs of a mantis are maggot-like, i.e. cylindrical and white or cream-coloured, and could easily be mistaken for small maggots unless examined under a microscope. Mantis eggs are enclosed in a thin membrane, not a shell, because the hardened foam of the ootheca acts as the shell; the foam is only produced when the eggs are laid so the maggot-like eggs are clearly seen if a gravid female is cut open. It may even be possible (I'm guessing here) that eggs retained in the body could develop to such a stage that they will actually move when removed from the body.

It is unlikely that the objects seen were maggots (insect larvae). Although there are parasitic insects which lay their eggs in the bodies of other insects (e.g. some Hymenoptera, and some Diptera) one would not expect the body of something as large as a mantis to be "full of maggots" - certainly not in captivity where the chance of multiple attacks by parasitic insects is remote.

Some nematodes are indeed parasites of orthopteroid insects, however such worms would not usually be mistaken for maggots since most are very long and slender; I have some nematodes which are more than 300mm long but less than 1mm in diameter, they were taken from wild caught phasmids. Small nematodes (i.e. "maggot" length) would generally be too thin to be seen without a microscope. The nematodes which are usually reported in locusts are large and are eaten as eggs on the grass on which the locusts are fed. They develop inside the body of the host and emerge when adult (usually killing the host in the process of emerging), they then have a free-living stage in which they lay their eggs on plant leaves. These nematodes would be very unlikely to be passed to a mantis eating the host because (certainly in the later stages) they would be chewed before being swallowed. Smaller nematodes could be passed from another host to a mantis. Crickets reared by dealers are extremely unlikely to be sources of parasitic nematodes, such crickets are rarely fed on fresh food and are therefore unlikely to encounter the eggs.

Maggots and nematodes are easily distinguished under a microscope since the maggot's body is clearly divided into segments, nematodes are not visibly segmented.

Egg-binding, the inability of an otherwise healthy female to lay eggs, is not uncommon in captive mantids. I think it may be related to dehydration of the female, certainly when it has happened with mine dissection has always shown the female's body to be relatively dry. If this is the case, supplying drinking water should help to prevent this condition. An alternative could be that the female retains the eggs because the external conditions are not right, she then waits too long and is unable to lay. I do not usually provide my mantids with water but if I think laying is overdue I may spray them with water occasionally. On several occasions I have noticed females laying immediately after their cage has been sprayed - much too soon for drinking to have had an effect on them, suggesting the laying has been stimulated by the rise in atmospheric humidity.

## The Mantis as an Auditory Cyclops - David Yager.

This is intended to be the first article in a series on mantis hearing. The other titles are: 'Mantids without ears: the puzzle of the deaf females', 'The auditory bicyclops: mantids with two ears', and 'Coming in on a wing and an ear: how mantids use their hearing'.

Mantids have such striking eyes, such a piercing gaze - thanks to their pseudopupils and mobile neck-and such spectacular visual behaviours, that it came as a considerable surprise to find that they are quite talented in the auditory realm as well. To some extent, this was a classic example of expectation misguiding scientific research. First, mantis eyes and the preferred observing times of entomologists led to the belief that mantids are solely diurnal, visual creatures. Secondly, no one had ever heard mantids make sounds except, in a few cases like *Mantis religiosa*, to scare off attackers. Finally, auditory animals generally have two ears, one on each side of the body, that can be recognized by their translucent, membranous eardrum (tympanum); mantids have no such structures. These observations led to the clear expectation that sound plays no role in mantis life, and no one really looked very hard for auditory capability in these creatures.

It turns out that most mantids can, indeed, hear quite well and have complex acoustic behaviours that we are just beginning to understand. The ear doesn't look like any other insect ear, and they apparently use it exclusively in their nocturnal activities - all quite contrary to expectation. As often happens, these discoveries came about mostly by luck and ignorance of the earlier scientific literature, spiced with liberal doses of curiosity and improved technology.

In larger genera like *Hierodula* or *Sphodromantis* or *Tenodera* you can easily see the ear on the ventral thorax between the bases of the two metathoracic legs. Look for a deep slit that is 1-2mm long oriented along the long axis of the body. Under magnification, you will see two rounded knobs of cuticle at the anterior end of the slit. How do we know that is the one and only ear of the mantis? These days it's very easy to monitor the activity of nerve cells sending information to the brain of mantids using electrodes placed in the neck region. When you play sound to a mantis, these electrodes pick up an almost immediate burst of activity, indicating that the animal heard the sound. If you play the same sound to a mantis whose metathoracic slit is filled with Vaseline, the activity completely disappears. Conversely, if you bury the entire mantis except the slit under a mound of Vaseline (yes, we really did this ...), it still hears perfectly well. Thus, the slit is both necessary and sufficient for hearing.

Mantids have two tympana that work together. These areas of very thin cuticle are built into the walls of the slit so that they face each other across a separation of only about 0.1mm. While the exact physics is still murky, we find that by having the tympana arranged like this in a deep complex slit, the mantis approximately doubles its sensitivity to sound. There is, however, a cost to this cyclopean design: mantids cannot tell where a sound is coming from. Most animals have two ears widely separated on the sides of the body or head to allow them to pinpoint the source of a sound, but with a single midline ear, a mantis can't even tell whether the sound is coming from right or left.

The internal anatomy of the mantis ear is dominated by large tracheal air sacs that adhere to the inner surface of each tympanum. These are essential for sensitive hearing in the same way that our middle ear air space is: they allow the tympanum to vibrate freely without the damping effect fluid behind the tympanum would have. The vibrations of the tympana are detected by clusters of 35-45 sensory nerve cells adjacent to the air sacs; these nerve cells transmit the acoustical information to the central nervous system. By recording

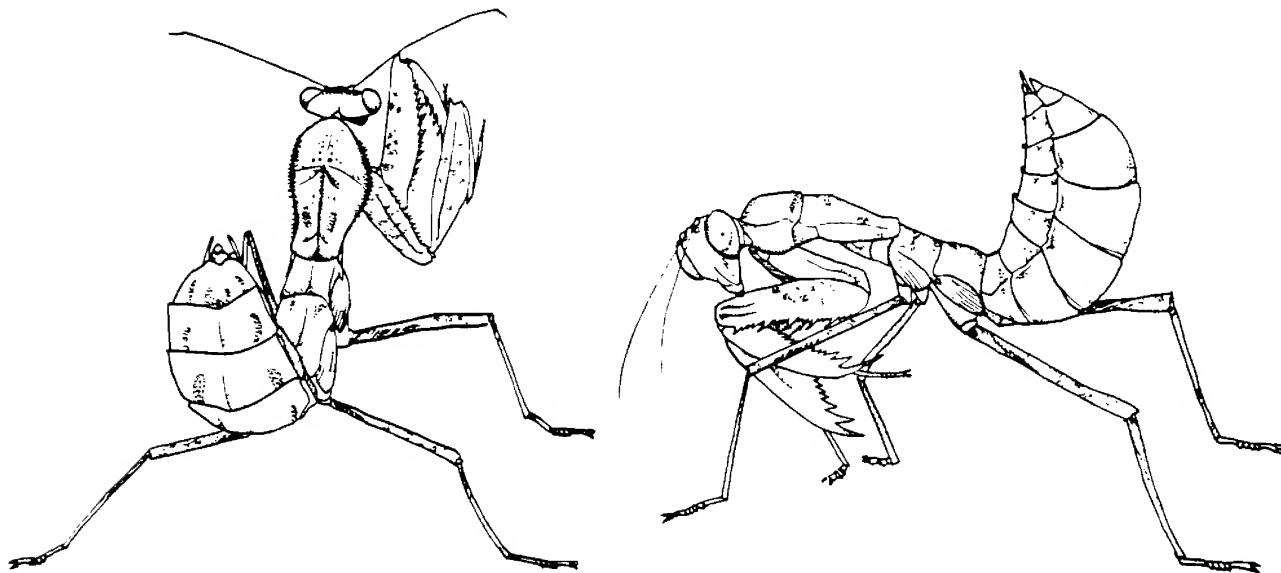
the activity of individual nerve cells in the central nervous system, we now know that the signals originating at both tympana are pooled together before travelling up to the brain.

What exactly can mantids hear? We routinely obtain audiograms-graphs of hearing sensitivity at different frequencies-on every new mantis species that comes through the lab (about 65 so far). We can do this by observing behavioral responses, but it is faster and more reliable to obtain the information using neural recording. The answer is that mantids listen exclusively to ultrasound (frequencies above 20kHz, the upper limit of human hearing) and are deaf to sounds that we humans can hear. The majority of species are most sensitive at 25-50kHz. We have recently, however, discovered a few species - unrelated to each other - that hear best at over 70kHz (one of these is most sensitive to 100-130kHz!!). There is no indication that a mantis can discriminate different frequencies - they are tone deaf.

The mantis auditory system is comparable in its sensitivity to many other insects like crickets, green lacewings, tiger beetles and many moths, but less sensitive than locusts and grasshoppers. Insects in general cannot hear sounds as weak as birds and mammals can. To put some numbers to it: the most sensitive mammal I know of is one of the bats with its hearing threshold at -10dB SPL; the human threshold is 0dB SPL; mantids and their colleagues are at 40-60dB SPL (that would be a very soft whisper to us).

The obvious question is why the mantis should have 'chosen' such an odd location and structure for their ear. After all, they are the only creature that we know of with a single ear. (Certain flies have an auditory organ in the midline under their 'chin', but the two halves function like two ears.) Simply put, I don't have a clue. I do have some faith, however, that as we understand more of mantis natural history and evolution and of the physics of the mantis ear, we will get closer to an answer.

Next time: Not all mantids can hear, and this creates some interesting puzzles. Not least among them is why, in many species, the males hear and the females are deaf.



*Sphodromantis* nymphs - drawn by Daniel Hallett.

# Keys to genera of all families except Mantidae

by David Oliveira, 62 Coombe Lane West, Kingston, KT2 7BY, U.K.

As with the keys to families and subfamilies in previous *MSG Newsletters*, the following keys are based on translations of the works of Giglio-Tos (1927, Orthoptera, Mantidae. *Tierreich*, 50: 1-707) and Beier (1968, Mantodea (Fangheuschrecken). *Handbuch der Zoologie*, 4(2)2/12: 1-47) and follows the classification of Beier with some details filled in by reference to Giglio-Tos. The same limitations apply: the key is entirely derivative, not based on any original observations by me and I may well have introduced errors in the translation, in addition to any errors in the original sources. There are also, of course, the underlying taxonomic difficulties.

Genera described since Beier (1968) are not included.

Any comments, criticisms or additions would be very welcome.

The following are the keys to the remaining subfamilies of mantids which were not keyed in earlier issues of the *MSG Newsletter*. The key to subfamilies may be found in *MSG Newsletter* 1: 10-14. Keys to the family Mantidae are in *MSG Newsletters* 2: 11-26 and 3: 5-10.

## Family Amorphoscelididae

### Subfamily Amorphoscelidinae

1.	Pronotum of greater length than width. . . . .	<i>Paramorphoscelis</i>
-	Pronotum keel-shaped, of greater width than length. . . . .	2
2.	Anterior femur without marginal spines. . . . .	<i>Amorphoscelis</i>
-	Anterior femur with 4 medial marginal spines. . . . .	<i>Perlamanitis</i>

### Subfamily Paraoxypilinae

1.	Supra-anal plate of female small, transverse. . . . .	<i>Sphaeromantis</i>
-	Supra-anal plate of female large, carinate. . . . .	2
2.	Anterior coxa of both sexes spined (heavily in the female). Female apterous. . . . .	3
-	Anterior coxa of female unarmed, or only lightly so. Female winged. . . . .	4
3.	Anterior border of the anterior prothoracic-coxal joint simple. . . . .	<i>Paraoxypilus</i>
-	Anterior border of the anterior prothoracic-coxal joint raised in a spine. . . . .	<i>Myrmecomantis</i>
4.	Pronotal disc unarmed. . . . .	<i>Phthersigena</i>
		[synonym <i>Glabromantis</i> ]
-	Pronotal disc armed with points. . . . .	5
5.	Superior border of anterior femur abruptly stepped before the end. . . . .	<i>Metoxypilus</i>
-	Superior border of anterior femur not stepped, arched. . . . .	<i>Gyromantis</i>

- \* Also mentioned by Giglio-Tos: *Triaenocorypha*
- \* Also mentioned by Beier: *Nesoxypilus*

### Family Eremiaphilidae

1. Tarsal segmentation 5:5:5. . . . .	<i>Eremiaphila</i>
- Tarsal segmentation 4:3:3. . . . .	<i>Heteronutarsus</i>

### Family Empusidae

#### Subfamily Empusinae

1. Posterior four femora with dorsal preapical lobes. Front femora expanded with a dorsal lobe. . . . .	<i>Gongylus</i>
- Posterior four femora without dorsal preapical lobes. Front femora not very expanded, the superior border straight, or almost straight. . . . .	2
2. Posterior four femora simple, without lobes. . . . .	3
- Posterior four femora, or at least the middle femora, with lobes. . . . .	4
3. Geniculate spine of posterior four femora short. . . . .	<i>Empusa</i>
- Geniculate spine of posterior four femora long, the tip overlapping the apical lobe. . . . .	<i>Hemiempusa</i>
4. Dorsal spike of frontal sclerite curved. The distal membranous portion of protuberance on vertex shorter than the thick basal portion. . . . .	<i>Idolomorpha</i>
- Dorsal spike of frontal sclerite straight. The distal membranous portion of protuberance on vertex longer than the thick basal portion. . . . .	<i>Hypsicorypha</i>

#### Subfamily Blepharodinae

1. Anterior coxa with broad lobe. . . . .	<i>Idolum</i>
- Anterior coxa without broad lobe. . . . .	2
2. Posterior 4 femora with preapical lobes. . . . .	<i>Blepharopsis</i>
- Posterior 4 femora without preapical lobes. . . . .	<i>Blepharodes</i> (inc. <i>Phlaebarodes</i> Giglio-Tos)

### Family Hymenopodidae

Note: There is some disagreement as to whether *Oxypilinae* belongs in this family.

#### Subfamily Oxypilinae

1. Pronotum as long as anterior coxa. . . . .	<i>Pseudoxypilus</i>
- Pronotum shorter than anterior coxa. . . . .	2

2.	Prozone of pronotum with two conical tubercles. . . . .	3
-	Prozone of pronotum with four conical tubercles. . . . .	4
3.	Metazone of pronotum with four tubercles. . . . .	<i>Pachymantis</i>
-	Metazone of pronotum with two tubercles. . . . .	<i>Ceratomantis</i>
4.	Posterior femora with three tooth-shaped lobes. . . . .	<i>Junodia</i>
-	Posterior femora smooth. . . . .	5
5.	Distal external spines of anterior femora equal in length to proximal spines. Female apterous. . . . .	<i>Oxypilus</i> (inc. <i>Anoxypilus</i> Giglio-Tos)
-	Distal external spines of anterior femora shorter than proximal spines. Female winged. . . . .	<i>Euoxypilus</i>

### Subfamily Acromantinae

#### Key to tribes

1.	Front femora with four outer spines. . . . .	Acromantini
-	Front femora with 5-7 outer spines. . . . .	2
2.	Front femora with 4 discoidal spines. . . . .	Epaphroditini
-	Front femora with 3 discoidal spines. . . . .	Acontistini

#### Tribe Acromantini

1.	Eyes rounded, bulging; not cone shaped. . . . .	2
-	Eyes distinctly cone shaped. . . . .	15
2.	Pronotum slim, distinctly longer than anterior coxa; well-defined supra-coxal bulge. . . . .	3
-	Pronotum squat, shorter or at most only as long as anterior coxa; poorly defined supra-coxal bulge. . . . .	13
3.	Pronotal shield without tubercles. . . . .	4
-	Pronotal shield with cone-shaped tubercles. . . . .	12
4.	Middle and posterior femora without lobes. . . . .	<i>Anaxarcha</i>
-	Middle and posterior femora with preapical lobes. . . . .	5
5.	Internal apical lobes of anterior coxa adjacent. . . . .	6
-	Internal apical lobes of anterior coxa separated. . . . .	9
6.	Vertex without tubercle above ocelli. . . . .	7
-	Vertex with cone-shaped tubercle above ocelli. . . . .	8
7.	Elytra with finely meshed veins. . . . .	<i>Heliomantis</i>
-	Elytra with widely spaced veins. . . . .	<i>Oligomantis</i>

8. Middle and posterior femora with only a single subapical lobe. Elytra with widely spaced veins. . . . . *Rhomantis*

- Middle and posterior femora with 3 lobes. Elytra with finely meshed veins. . . . . *Psychomantis*

9. Anterior femora with a projecting three-cornered lobe on dorsal aspect. *Citharomantis*

- Anterior femora with dorsal border more or less bent, lamelliform, but without a lobe. . . . . 10

10. Dorsal aspect of frontal sclerite blunt. . . . . *Neacromantis*

- Dorsal aspect of frontal sclerite three-cornered. . . . . 11

11. Vertex with at most a small tubercle above the ocelli. . . . . *Acromantis*

- Vertex with cone-shaped projection. . . . . *Anasigerpes*

12. Anterior coxa strongly armed. . . . . *Ephippiomantis*

Anterior coxa almost unarmed. . . . . *Catasigerpes*

13. Anterior femora normal, not dilated. . . . . *Odontomantis*

- Anterior femora dilated with lamellae. . . . . 14

14. Pronotal disk without tubercles. . . . . *Hestiasula*

- Pronotal disk with tubercles. . . . . *Chrysomantis*

15. Pronotum slim, longer than anterior coxa. . . . . *Metacromantis*

- Pronotum squat, shorter than anterior coxa. . . . . 16

16. Pronotal disk without tubercles. . . . . *Otomantis*

- Pronotal disk with tubercles. . . . . 17

17. Vertex without process. . . . . *Anoplosigerpes*

Vertex with single process above ocelli. . . . . *Uvaromantis*

\* Included by Giglio-Tos but not Beier: *Ambivia*, *Danuriella*, *Phyllothelys*.

#### Tribe Epaphroditini

1. Eyes round. Posterior tibia with large lobes. . . . . *Phyllocrania*

- Eyes cone shaped. Posterior tibia without lobes. . . . . 2

2. Anterior femora with 7 external spines. . . . . *Metilia*

- Anterior femora with 5-6 external spines. . . . . 3

3. Anterior femora with 6 external spines. Pronotum not expanded with lateral lobes. 4

- Anterior femora with 5 external spines. Pronotum expanded with lateral lobes. . . 5

4. Vertex with bifid projection above ocelli. . . . . *Pseudacanthops*  
 - Vertex without projection. . . . . *Acanthops*  
     [synonym *Decimia*]

5. Hind femora with dorsal preapical lobe. . . . . *Antenna*  
 - Hind femora without dorsal preapical lobe. . . . . *Epaphrodita*

\* Included by Giglio-Tos but not Beier: *Parablepharis*.

**Tribe Acontistini**

1. Mediastinal vein of costal area of elytra without distinct oblique branches. External spines of anterior tibia closely packed, layered. . . . . *Acontista*  
 - Mediastinal vein of costal area of elytra with distinct oblique branches. External spines of anterior tibia straight, spaced. . . . . *Tithrone*

\* Included by Giglio-Tos but not Beier: *Astollia* F. Kirby  
 Included by Beier but not Giglio-Tos: *Acontistella* Beier

**Subfamily Hymenopodinae**

1. Pronotum with expanded supracoxal lateral lobes, the whole as a result cross-shaped. . . . . 2  
 - Pronotum without markedly expanded supracoxal lateral lobes, the whole more or less oval, not cross-shaped. . . . . 6

2. Anterior femora with three discoidal spines. . . . . 3  
 - Anterior femora with four discoidal spines. . . . . 4

3. External marginal spines of anterior femora markedly bulbous at their bases. . . . . *Pseudocreobotra*  
 - External marginal spines of anterior femora plain, not markedly bulbous at their bases. . . . . *Theopropus*

4. Eyes pointed, cone shaped. . . . . *Harpagomantis*  
 - Eyes rounded. . . . . 5

5. Prozone of pronotum with obtuse tubercles. Anterior femora stocky. *Anabomistria*  
 - Prozone of pronotum with pointed tubercles. Anterior femora slim. . *Chlidonoptera*

6. Anterior femora with 3 discoidal and 5 outer spines. . . . . *Callibia*  
 - Anterior femora with 4 discoidal and 4 outer spines. . . . . 7

7. Eyes round. . . . . 8  
 - Eyes cone shaped. . . . . 10

8.	Middle and posterior femora without lobes. Frontal sclerite with a central keel.	<i>Chloroharpax</i>
-	Middle and posterior femora with lobes. Frontal sclerite smooth, without central keel.	9
9.	Vertex without protuberance.	<i>Propanurgica</i>
-	Vertex with protuberance above ocelli.	<i>Panurgica</i>
10.	Pronotum slim, longer than anterior coxa.	<i>Galinthias</i>
-	Pronotum squat, shorter than anterior coxa.	11
11.	Middle and posterior femora with large lobes, occupying at least half the length of the femur.	12
-	Middle and posterior femora with small preapical lobes only.	13
12.	Vertex without protuberance. Eyes bluntly conical.	<i>Parymenopus</i>
-	Vertex with protuberance. Eyes sharply conical.	<i>Hymenopus</i>
13.	Tubercles above ocelli pointed.	<i>Pseudoharpax</i>
-	Tubercles above ocelli blunt.	14
14.	Eyes with small terminal tubercle.	<i>Helvia</i>
-	Eyes without terminal tubercle.	<i>Creobroter</i>

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### Oothecae shape - Phil Bragg.

The oothecae illustrated on page 2 are both from the same species, *Sphodromantis lineola*. The one on the left is a rather unusual shape and I can only assume that the female was standing in an unusual position when it was laid; all others laid by this female were the typical shape of the one on the right. In both cases the twigs were of similar size and at a similar angle (as shown), and the cages were the same size.

## Mantis abstracts

The following are abstracts from papers published recently. The papers are in English unless otherwise indicated. The editor would be grateful for copies of any recently published papers so that abstracts may be included in this section of the newsletters.

**Bland, R.G., Gangwere, S.K. & Morales Martin, M.** (1996) An annotated list of the Orthoptera (*sens. lat.*) of the Canary Islands. *Journal of Orthoptera Research*, **5**: 159-173.

The distribution of 117 Canary Island orthopteroid species belonging to Orders Blattaria, Mantodea, Orthoptera, and Phasmida are presented based on the authors' collections, museum specimens, and literature since the last list in 1954. The number of species in each order and the percentage endemic to the archipelago are: Blattaria 24 (50%); Mantodea 9 (67%); Orthoptera 83 (37%), and Phasmida 1 (0%). The same for families of Orthoptera follows: Acrididae 41 (41%); Gryllidae 18 (17%); Gryllotalpidae 2 (0%); Pamphagidae 4 (100%); Pyrgomorphidae 1 (0%); Tetrigidae 1 (0%); and Tettigoniidae 16 (44%). Orthopteroid species diversity and the number of endemics were greatest on Tenerife (82 species, 24 endemics), followed by Gran Canaria (64 species, 17 endemics), and La Gomera (49 species, 14 endemics); Fuerteventura had the fewest number of species (28) and the lowest number of endemics (5). Tenerife supported the highest number of single-island endemics (8) and La Palma had the lowest (1). The highest percentages of endemics, 27% to 29%, occurred on Tenerife, La Gomera, La Palma, Lanzarote, and Gran Canaria; Fuerteventura had 18% and El Hierro 17%.

New species, changes in nomenclature, and unconfirmed records are discussed, as are taxonomic problems encountered in taxa of the acridid genera *Sphingonotus* and *Acrotylus*.

**Kaltenbach, A.P.** (1996) Records for a monograph on Mantodea of Southern Africa: 1. Species inventory, geographical distribution, and distribution limits (Insecta: Mantodea). *Annalen des Naturhistorischen Museums in Wien, Serie B Botanik und Zoologie*, **98**: 193-346.

The results of studies on Mantodea of Southern Africa during the last 12 years are presented. This research is based on a large number of specimens received for identification from African and European entomological institutions. The composition of the Southern African fauna of praying mantids and the distribution of the species were investigated. Sixty-six genera and 185 species of Mantodea are presently known from Southern Africa. Six genera, one subgenus (*Hapalogymnes*, *Pseudodystacta*, *Euentella*, *Namamantis*, *Chopardentella*, *Ligentella*, *Rogermanitis*), 28 species and one subspecies are regarded as new for science. A checklist is including new synonym. Finally, the influence of environmental factors on the distribution of some species is discussed. [In German]

**Naeem, M. & Yousuf, M.** (1996) Mantodea (Dictyoptera) from the Punjab Province of Pakistan. *Entomologist's Monthly Magazine*, **132**: 281-284.

The taxonomy and biology of mantids, an important group of predators, has been neglected in Pakistan. Partially to redress this, mantids were collected from various localities of the Punjab Province during 1990 and 1991, yielding 30 species in 21 genera and 5 families. Thirteen species, namely *Amorphoscelis annulicornis*, *Empusa pennicornis*, *Blepharopsis nuda*, *Odontomantis sinensis*, *Aethalochroa ashmoliana*, *Heterochaefula fissispinis*, *Iris tiflisina*, *Deiphobella laticeps*, *Eufischeriella fraterna*, *Deiphobe brunneri*,

*Ormomantis indica*, *Mantis nobilis* and *Tenodera aridifolia* are recorded for the first time from Pakistan. An undescribed *Ormomantis* species is recognised.

**Roy R.** (1996) *Reticulimantis* Roy, 1973, new synonym of *Pseudostagmatoptera* Beier, 1931 (Dict. Mantidae). *Bulletin de la Societe Entomologique de France*, **101**(3): 234. [In French] [Brief note only].

**Rosset S.** (1996) Binocular vision in insects: How mantids solve the correspondence problem. *Proceedings of the National Academy of Sciences of the United States of America*, **93**(23): 13229-13232.

Praying mantids use binocular cues to judge whether their prey is in striking distance. When there are several moving targets within their binocular visual field, mantids need to solve the correspondence problem. They must select between the possible pairings of retinal images in the two eyes so that they can strike at a single real target. In this study, mantids were presented with two targets in various configurations, and the resulting fixating saccades that precede the strike were analyzed. The distributions of saccades show that mantids consistently prefer one out of several possible matches. Selection is in part guided by the position and the spatiotemporal features of the target image in each eye. Selection also depends upon the binocular disparity of the images, suggesting that insects can perform local binocular computations. The pairing rules ensure that mantids tend to aim at real targets and not at "ghost" targets arising from false matches. The work was done using *Sphodromantis viridis*.

## Papers noted

The following has been noted but no abstract has been received.

**Collett, T.S.** (1996) Vision: Simple stereopsis. *Current Biology*, **6**(11): 1392-1395.

Keywords: Praying mantis, Salamander, Amphibian, Vision, Simple stereopsis, Sense organs, Prey capture.

## Stick insects

Interested in stick insects? The Phasmid Study Group produces a newsletter and a journal for people interested in phasmids. The group has a livestock co-ordinator and regular meetings. There are about 500 members worldwide. For further details contact the Membership secretary: Paul Brock, 40 Thorndike Road, Slough, Berks, SL2 1SR, U.K.